SCIENTIFIC TEMPER AND ACADEMIC ACHIEVEMENT OF GUJJAR AND NON-GUJJAR STUDENTS – A COMPARATIVE STUDY

*Mohammad Sayid Bhat**

Abstract

The study is an attempt to compare Gujjar and Non-Gujjar students of Kashmir valley on Scientific Temper and Academic Achievement. Four objectives were formulated for the present study with three hypotheses. 240 sample subjects (120 Gujjar and 120 Non-Gujjar students were selected randomly for the sample. To measure the Scientific Temper, Scientific Temper Potentiality Scale was used and for Academic Achievement previous Board examination marks of sample subjects were considered. For the analysis, mean, SD and t-test were used. The study shows a significant mean difference between Gujjar and non-Gujjar students on Scientific Temper and on Academic Achievement. The study also found that there is a significant positive correlation between Scientific Temper and Academic Achievement.

Key Words: *Scientific temper; Academic Achievement; Gujjar Students, Non-Gujjar students;*

Introduction

Science is a mode of accepting the world, a viewpoint and an outline of thinking that begins early in one's life. Scientific advances over the last fifty years have led to radical changes in education, health, nutrition, communication, transportation and generally enhancing socio-economic development and the quality of our lives. The role of science promises to be greater in the future because of the ever-more-rapid scientific progress. Our society is becoming increasingly dependent on science and technology. It is essential for the well being of our society that all citizens develop "science

* Assistant Professor, Department of Education, Central University of Kashmir

literacy", an appreciation of science, the benefits of technology, and the population risks associated with advances in both.

In an endeavor to enhance the interest of students in basic sciences, the mental approach which is behind the method of acquiring dependable and practical knowledge may be called as "Scientific Temper"

It means an outlook, emphasizing that nothing in the world should be taken for granted or accepted on the basis of sightless faith without it being subjected to the test of rationale. The scientific temper stresses investigation seeks evidence without any bias or chauvinism.

The man with such a temper studies a subject with openness of mind and neutrality, because he wants to know and scrutinize a thing as it is and not as he wishes it to be. With this impersonal outlook towards a problem, the observation that an explorer makes and the conclusions he arrives at are provable by any one at any time and at any place. This is so because a law, attitude or occurrence in nature is universal and not confined to any individual or place. In other words we can illustrate scientific temper as an approach of psyche characterized by curiosity, open-mindedness, rationality, aversion to condescension, objectivity of intellectual belief and suspended judgment.

Review of Related Literature

As Narlikar opined, 'Today we live in a free India that is feeling its way towards economic prosperity. Yet we are still a long way from achieving that scientific outlook which Nehru considered so essential for our future wellbeing' (Narlikar, 2003). If one were to pick out three or four most important reasons for the country's backwardness or failure in many areas, the lack of scientific temper would be one of them (Bhargava and Chakrabarti, 2010). Various studies have been conducted on scientific temper and academic achievement and in some studies some groups have also been compared. Dilruba S. (2010) has compared Kashmiri students with Pukhton Students on Scientific Temper ad Academic Achievement and found that Kashmir students have better scientific temper and academic achievement. Kour S. (2015) found that there exists no significant difference between high and low achieving adolescent girl on open mindedness and aversion to superstition dimension of scientific temper. Bekmezci, M. *et. al.* (2015) investigated students' scientific attitude, computer anxiety, educational use of the Internet, the problematic Internet use and academic achievement (gender, parent educational level, and daily access to the Internet) are investigated based on various variables and some significant relations were found. Welch, Anita. G. (2011) found that students who participated in a robotic competition had a more positive attitude toward science and science-related areas in four of the seven categories examined: social implications of science, normality of scientists, attitude toward scientific inquiry, and adoption of scientific attitudes. Yang, Il-Ho *et. al.* (2017) revealed that Korean middle school students primarily held mixed or naïve

views about scientific inquiry. They suggested that explicit and reflective instruction is necessary to develop students' views about scientific inquiry. Pelch, Michael A.; McConnell & David A. (2017) emphasis of socio-scientific issues can positively influence students' attitudes about science and their perceptions on the relevance of science. These findings have potential implications for the selection of content for introductory science courses, and demonstrate the utility of designing or adapting geo-science lessons based around socio-scientific issues. Talavera, I. (2016) revealed that science education that helps students directly by encouraging them to analyze and evaluate all kinds of phenomena, scientific, pseudoscientific, and other. Accordingly, the focus of this treatise is on critical thinking as it may be applied to scientific claims to introduce the major themes, processes, and methods common to all scientific disciplines so that the student may develop an understanding about the nature and practice of science and develop an appreciation for the process by which we gain scientific knowledge. Genç, M. (2015) indicated that the students' scientific literacy had increased significantly, and that their attitudes towards science were more positive. In terms of both gender and class level of the students, a significant difference emerged after the application, when compared to before the application. Demir, E. (2016) constructed A secondary-level structural model was by using PISA data. Limitations of the model, best predictor of scientific literacy skills were "socio-economic status." Students' "opinions for teacher" shows negative correlation with scientific literacy skills. Students' 'attitudes for school' have low but positive correlation with scientific literacy skills. Among indicators, best predictor of scientific literacy skills is "home possessions." It is followed by "index of economic, social and cultural status" and "wealth." Lowest predictors among indicators are "attitude towards school: learning outcomes," "attitude towards school: learning activities" and "sense of belonging to school" respectively. All these variables are positively correlated with scientific literacy skills. Chen, Chun *et. al.* (2015) indicated that the experimental group outperformed the control group, regardless of scientific concept test, scientific concept-dependent reasoning test, and scientific inquiry test. Moreover, the classroom inquiry worksheets results demonstrated that the experimental group generated a significantly greater number of testable hypotheses, correct hypotheses, and correct evidence-based scientific explanations and a higher level of scientific reasoning than did the control group. Siribunnam S. *et. al.* (2014) revealed that the learning ability of students in science is improved by socio-scientific decision-making, an important activity that improves a student's scientific literacy, conceptual understanding, scientific inquiry, attitudes, and social values. The socio-scientific issues must be discussed during science classroom activities in the current state of 21st century skills. Kapucu, S. *et. al.* (2015), concludes that there are positive and significant relationships among Turkish high school students' scientific epistemological beliefs, self-efficacy in learning physics and their attitudes toward physics. Senler, B. (2015) revealed that there is a significant difference in students' views of scientific inquiry between the countries.

Need and Importance of Present Stuy

Science has several rewards, but the greatest is that it is the most interesting, difficult pitiless, exciting and beautiful pursuit that mankind has devised so far. In fact, if one were to consider the best art produced in the last century it can be termed as "science". Science education has an important role to play in the all-round cultural and societal development of human kind and for evolving a civilized society. The essence of scientific spirit is to think globally and act locally, since scientific knowledge is universal in nature while the fruit of science have some site specify. Scientific temper is an intrinsic quality. It has to be imbibed and not merely imparted. But in our anxiety not to invest our best brains outside the country, we seem to have resorted to imparting scientific temper in our education curriculum and not inculcating this spirit in our minds. This trend ha to be reversed and the teacher and taught both have vital and responsible roles in this endeavour. Scientific temper has to be an inherent quality in our young minds and it should be cultivated in them as a matter of routine and the curriculum based attempts will not be always complete and this has to be a societal responsibility too. Great minds that our teachers are, they can contemplate this and devise methods to incorporate scientific temper in our young minds which will go a long way in the technological progress of this country. Therefore, it is justified, that for the well being and progress of the nation, the research in science education is urgently addressed to the problem of developing scientific temper in the students and this can be studied when we assess the impact of science teaching in terms of building up of scientific temper. Thus from the above discussion, the need of the present study is justified.

Every section of the society should adopt and make use of science and technology in their lives. After reviewing the related literature the researcher has found that no study has been conducted on Scientific Temper and Academic Achievement in which Tribal and Non-trial students are compared and to fill this vacuum, the researcher has chosen this research problem.

Objectives

Following objectives have been formulated for the present study:

1. To measure the Scientific Temper of Gujjar and Non-Gujjar students of Kashmir Valley.
2. To compare the Scientific Temper of Gujjar and Non-Gujjar students of Kashmir Valley.
3. To measure the Academic Achievement of Gujjar and Non-Gujjar students of Kashmir Valley.
4. To compare the Academic Achievement of Gujjar and Non-Gujjar students of Kashmir Valley.

5. To find the Correlation between Scientific Temper and Academic Achievement.

Hypotheses

1. There is a significant mean difference between Gujjar and Non-Gujjar students of Kashmir valley on Scientific Temper.
2. There is a significant mean difference between Gujjar and Non-Gujjar students on academic achievement.
3. There is significant Positive Correlation between Scientific Temper and Academic Achievement.

Sample

The sample of the present study comprised of 120 Gujjar (60 boys and 60 girls) and 120 Non-Gujjar (Kashmiri) students (60 boys and 60 girls) drawn from the government secondary school of Kashmir from District Ganderbal, District Anantnag and from District Kupwara.

Tools

The tools for the present study were selected in a manner to achieve optimum level of confidence by the investigator for the accomplishment of the objectives of the study. The investigator selected the following tools to collect the relevant data.

1. Scientific Temper Scale constructed and standardized by Prof. Nadeem and Wani S. R. which assesses five dimensions of Scientific Temper i.e. Curiosity, Open Mindedness, Objectivity, Rationality and Aversion to Superstitions.
2. Aggregate percentage of marks in the previous board examination of sample subjects as indicator of academic achievement.
3. Academic Achievement:In this study academic achievement is considered the marks of last board examination of the sample subjects.

Statistical Treatment

The data collected was subjected to the following statistical treatment: Mean, S.D and t-test.

Analysis and Interpretation

In order to achieve the objectives formulated for the present study, the data collected has been tabulated as under:

Table 01: Showing Significance of mean difference between Gujjar and Non-Gujjar Students on Scientific Temper

Group	N	Mean	S.D	t-value	Level of significance
Gujjar	120	26.35	3.22	10.68	Significant at 0.01 level
Non-Gujjar	120	31.52	4.21		
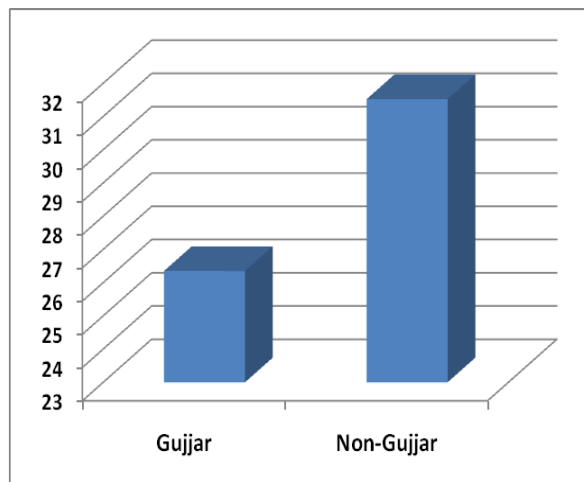
Figure: **Showing the mean comparison between Gujjar and non-Gujjar students on Scientific Temper**

The above table shows the mean difference between Gujjar and Non-Gujjar students towards the Scientific Temper and results reflect that the difference is significant as our calculated t-value (10.68) is higher than the tabulated t-value at .01 level of significance. The results indicate that Non-Gujjar students exhibit significantly scientific attitude than their Gujjar counterparts.

Table 02: **Showing Significance of mean difference between Non-Gujjar Boys and Non-Gujjar Girls on Scientific Temper**

Group	N	Mean	S.D	t-value	Level of significance
Non-Gujjar Boys	60	32.01	4.21	2.07	Significant at 0.05 level
Non-Gujjar Girls	60	31.03	4.32		

The above table shows the significance of mean difference between Non-Gujjar Boys and Non-Gujjar Girls towards Scientific Temper and the results reveal that the difference is significant at 0.05 level, as our calculated t-value (2.07) is higher than the tabulated t-value level of significance. This confirms that the attitude of Non-Gujjar Boys and Girls towards Scientific Temper is significantly different and the results favour Non-Gujjar boys.

Table 03: **Showing Significance of mean difference between Gujjar Boys and Gujjar Girls on Scientific Temper**

Group	N	Mean	S.D	t-value	Level of significance
Gujjar Boys	60	26.47	2.09	0.29	Not Significant
Gujjar Girls	60	26.23	2.98		

The above table shows the significance of mean difference between Gujjar Boys and Gujjar Girls towards Scientific Temper and reveals that the difference is insignificant, as our calculated t-value (0.29) is less than the table t-value. This confirms that the attitude of Gujjar Boys and Gujjar Girls towards Scientific temper is similar.

Table 04: Showing Significance of mean difference between Gujjar Boys and Non-Gujjar Boys on Scientific Temper

Group	N	Mean	S.D	t-value	Level of significance
Gujjar boys	60	26.47	2.09	8.73	Significant at 0.01 level
Non-Gujjar boys	60	32.01	3.05		

The above table shows the significance of mean difference between Gujjar Boys and Non-Gujjar Boys towards the Scientific Temper and depicts that the difference is significant at .01 level, as our calculated t-value (8.73) is higher than the table value at .01 level of significance. This confirms that the attitude of Non-Gujjar Boys and Gujjar Boys towards science is different and the Non-Gujjar students possess better attitude than their Gujjar counterparts.
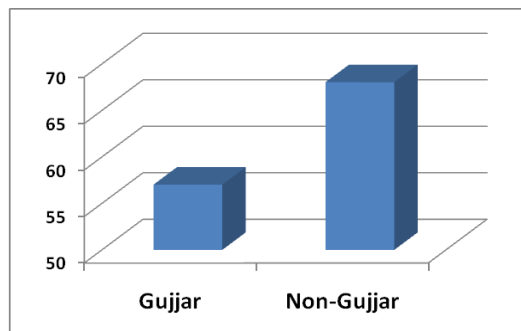
Table 05: Showing Significance of mean difference between Gujjar Girls and Non-Gujjar Girls on Scientific Temper

Group	N	Mean	S.D	t-value	Level of significance
Gujjar girls	60	26.23	4.05	2.40	Significant at .05 level
Non-Gujjar girls	60	31.03	6.03		

The above table shows the significance of mean difference between Gujjar Girls and Non-Gujjar Girls towards the Scientific Temper and depicts that the difference is significant at .05 level, as our calculated t-value (2.40) is higher than the tabulated t-value at .05 level of significance. This result specifies that the Non-Gujjar girls have better Scientific Temper than their Gujjar counterparts.

Table 06: Showing Significance of mean difference between Gujjar and Non-Gujjar Students on Academic Achievement

Group	N	Mean	S.D	t-value	Level of significance
Gujjar	120	57.02	11.06	4.92	Significant at .01 level
Non-Gujjar	120	68.04	9.12		

Figure: Showing the mean comparison between Gujjar and non-Gujjar students on Academic Achievement

The above table shows the significance of mean difference between Gujjar and Non-Gujjar Students on Academic Achievement and reveals that the difference is Significant, as our calculated t-value (4.92) is much higher than the table value at .01 level of significance. This confirms that both Gujjar and Non-Gujjar students show significantly different academic achievement and the study favours Non-Gujjar students.

Table 07: Showing Significance of mean difference between Non-Gujjar Boys and Non-Gujjar Girls on Academic Achievement

Group	N	Mean	S.D	t-value	Level of significance
Boys	60	66.06	9.69	0.58	Not Significant
Girls	60	69.98	10.35		

The above table Shows the Significance of mean difference between Non-Gujjar Boys and Non-Gujjar Girls on Academic Achievement and depicts that the difference is not significant; as our calculated t-value (0.58) is less than the tabulated t-value .This confirms that both Non-Gujjar Boys and Non-Gujjar Girls show similar academic achievement.

Table 08: Showing Significance of mean difference between Gujjar Boys and Gujjar Girls on Academic Achievement

Group	N	Mean	S.D	t-value	Level of significance
Boys	60	54.20	9.82	1.25	Not Significant
Girls	60	59.84	8.22		

The above table Shows the Significance of mean difference between Gujjar Boys and Gujjar Girls on Academic Achievement and depicts that the difference is

insignificant, as our calculated t-value (1.25) is less than the tabulated t-value. The results confirm that the Gujjar Boys and Girls show similar Academic Achievement.

Table 09: Showing Significance of mean difference between Gujjar Boys and Non-Gujjar Boys on Academic Achievement

Group	N	Mean	S.D	t-value	Level of significance
Gujjar Boys	60	54.04	9.82	2.14	Significant at .05 level
Non-Gujjar Boys	60	66.06	9.69		

The above table shows the Significance of mean difference between Gujjar Boys and Non-Gujjar Boys on Academic Achievement and reflects that the calculated t-value (2.14) is higher than the table value at .05 level of significance. The results confirm that the Non-Gujjar boys showed significantly better academic achievement.

Table 10: Showing Significance of mean difference between Gujjar Girls and Non-Gujjar Girls on Academic Achievement

Group	N	Mean	S.D	t-value	Level of significance
Gujjar Girls	60	58.02	8.22	1.21	Insignificant
Non-Gujjar Girls	60	52.04	10.35		

The above table shows the significance of mean difference between Gujjar Girls and Non-Gujjar Girls on Academic Achievement and depicts that the difference is not significant, as our calculated t-value (1.21) is less than the table value. This confirms that the Gujjar Girls and Non-Gujjar Girls show similar Academic Achievement.

Table 11: Showing Correlation between Scientific Temper and Academic Achievement of Gujjar and Non-Gujjar Students

Variable	N	Mean	SD	r	Level of Significance
Scientific Temper	120	28.92	3.72	0.73	Significant
Academic Achievement	120	62.53	10.09		

The table 11 shows the correlation between Scientific Temper and Academic Achievement of Gujjar and Non-Gujjar Students. The table reveals that the mean of Scientific Temper is 28.92 and for academic achievement, it is 62.53. The SD calculated for Scientific Temper was recorded as 3.72 and for academic achievement, it was recorded as 10.09. The correlation calculated through SPSS was 0.73 which remained significant at 0.01 level. Thus, there is a significant correlation between Scientific Temper and Academic Achievement.

References

Bekmezci, Mehmet; Celik, Ismail; Sahin, Ismail; Kiray, Ahmet; Akturk, Ahmet Oguz (2015). Analysis of Scientific Attitude, Computer Anxiety, Educational Internet Use, Problematic Internet Use, and Academic Achievement of Middle School Students According to Demographic Variables. *International Journal of Social, Behavioral, Educational, Economic, Business and Industrial Engineering v9 n12 (p4006-4014).*

Bhargava, P. M. and Chakrabarti C (2010). *Angels, Devil and Science: A Collection of Articles on Scientific Temper.* National Book Trust, New Delhi, India.

Bryant, A.L. (2003). Role Models and Psychosocial Outcomes among African American Adolescents, *Journal of Adolescent Research vol.18. (p36-37).*

Chang, L.C. (2004). Subjective over Achievement in American and Chinese College Students. *Journal of Cross Cultural Psychology vol.35.*

Chen, Chun-Ting; She, Hsiao-Ching (2015). The Effectiveness of Scientific Inquiry With/Without Integration of Scientific Reasoning. *International Journal of Science and Mathematics Education, v13 n1 (p1-20).*

Demir, Ergül (2016). Characteristics of 15-Year-Old Students Predicting Scientific Literacy Skills. *Turkey International Education Studies, v9 n4 (p99-107).*

Dilruba S. (2010). *Scientific Temper and academic achievement of Kashmiri students and Pakhtoon students.* Unpublished Dissertation, Department of Education, University of Kashmir

Dubey, K.K. (1992). A Study of the Scientific Temper and its Measurement. *Fifth Survey* of *Educational Research vol.2. (p1240-1241).*

Genç, Murat (2015). The Effect of Scientific Studies on Students' Scientific Literacy and Attitude. *Ondokuz Mayis University Journal of Faculty of Education v34 n1 (p141-152).*

Greater Kashmir, (Daily Newspaper) (2007). January 6, 2007.

Greater Kashmir, (Daily Newspaper) (2016). March 9, 2016.

Gujjar Dash Charitable Trust (2015). *Awaz-e-Gurjar,* Jammu, Tawi. (Ed) March, April & August 2015.

Kapucu, Serkan; Bahçivan, Eralp (2015). High School Students' Scientific Epistemological Beliefs, Self-Efficacy in Learning Physics and Attitudes toward Physics: A Structural Equation Model. *Research in Science & Technological Education, v33 n2 (p252-267).*

Kour, Sunmeet (2015). Scientific Temper among Academically High and Low Achieving Adolescent Girls. *Journal of Education and Practice*, *v6 n34 (p96-101).*

Krejcie, R.V., & Morgan, D.W. (1970). Determining sample size for research activities. *Educational and Psychological Measurement*, 30. Retrieved 2009, from http://members. multimania.co.uk/renatonunes/tabela%20tamanho%20.

Krishnan, K. And Bhuvaneswari, G. (1990). What Does Scientific Temper Mean? *The Educational Review. Vol. / XCVL, September 1990, (p149-150).*

Mian, S. (1988). Intelligence, Neuroticism, Academic Achievement. A Comparison between Boys and Girls. *Fifth Survey of Educational Research (p 905).*

Narlikar, J. V. (2003). *The Scientific Age: The Indian Scientist from Vedic to Modern Times.* Penguin Books, New Delhi, India.

Pachaury A.C. (2000). *Indian Educational Review,* vol. 36(1).

Pelch, Michael A.; McConnell, David A. (2017). How Does Adding an Emphasis on Socioscientific Issues Influence Student Attitudes about Science, Its Relevance, and Their Interpretations of Sustainability? *Journal of Geoscience Education, v65 n2 (p203-214).*

Rao, D.B. (1990). Comparative Study of Scientific Attitude, Scientific Aptitude and Achievement in Biology at Secondary School Level. *Fifth Survey of Educational Research,vol.2. (p1258-1259).*

Senler, B. (2015). Middle School Students' Views of Scientific Inquiry: An International Comparative Study. *Science Education International, v26 n2 (p166-179).*

Siribunnam, Siripun; Nuangchalerm, Prasart; Jansawang, Natchanok (2014). Socio-Scientific Decision Making in the Science Classroom. *International Journal for Cross-Disciplinary Subjects in Education v5 n4 (p1777-1782).*

Subodh Mahanti (2013). Research Article: A Perspective on Scientific Temper in India. *Journal of Scientific Temper.v1, January 2013, (p. 46-62).*

Talavera, Isidoro (2016). The Acquisition of Scientific Knowledge via Critical Thinking: A Philosophical Approach to Science Education. *Forum on Public Policy Online, v2016 n2.*

Warikoo K. and Sujtt S. (2000). *Gujjars of Jammu & Kashmir*, (ed). Director Indra Gandhi Rashtriya Manov Sangrahalaya Shimla Hills, Bhopal- 462013.

Watkins, D. (1998). Cultural Dimensions, Gender and the Nature of Self-Concept- A Fourteen Century Study. *International Journal of Psychology 1998 vol.33 (p 17-31).*

Welch, Anita G. (2010). Using the TOSRA to Assess High School Students' Attitudes toward Science after Competing in the FIRST Robotics Competition: An Exploratory Study. *EURASIA Journal of Mathematics, Science & Technology Education, v6 n3 (p187-197).*

Welch, Anita; Huffman, Douglas (2011). The Effect of Robotics Competitions on High School Students' Attitudes toward Science. *School Science and Mathematics, v111 n8 (p416-424).*

Yang, Il-Ho; Park, Sang-Woo; Shin, Jung-Yun; Lim, Sung-Man (2017). Exploring Korean Middle School Students' View about Scientific Inquiry. *EURASIA Journal of Mathematics, Science & Technology Education, v13 n7 (p3935-3958).*